

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. – 26. (canceled)

27. (previously presented) A method for making a semiconductor device,
comprising:

forming a high-k gate dielectric layer on a substrate, the high-k gate dielectric layer
comprising impurities and oxygen;

exposing the high-k gate dielectric layer to a solution that comprises hydrogen
peroxide at a sufficient temperature for a sufficient time to remove impurities from the high-k
gate dielectric layer and to increase the oxygen content of the high-k gate dielectric layer;

applying sonic energy while the high-k gate dielectric layer is exposed to the solution
that comprises hydrogen peroxide; and then

forming a gate electrode on the high-k gate dielectric layer.

28. (previously presented) The method of claim 27, wherein sonic energy is
applied at a frequency of between about 10 KHz and about 2,000 KHz, while dissipating at
between about 1 and about 10 watts/cm².

29. (previously presented) The method of claim 28, wherein sonic energy is
applied at a frequency of about 1,000 KHz, while dissipating at 5 watts/cm².

30. (previously presented) The method of claim 27, wherein the solution that
comprises hydrogen peroxide is an aqueous solution that contains between about 2% and
about 30% hydrogen peroxide by volume, and wherein the high-k gate dielectric layer is

exposed to the aqueous solution at a temperature that is between about 15°C and about 40°C for at least about one minute.

31. (previously presented) The method of claim 30, wherein the aqueous solution contains about 6.7% hydrogen peroxide by volume, and wherein the high-k gate dielectric layer is exposed to the aqueous solution for about 10 minutes at a temperature of about 25°C.

32. (new) The method of claim 27, wherein the impurities in the high-k gate dielectric layer comprise chlorine.

33. (new) The method of claim 32, wherein the impurities permeate through the high-k gate dielectric layer.

34. (new) The method of claim 32, wherein the high-k gate dielectric layer is exposed to the solution that comprises hydrogen peroxide at a sufficient temperature for a sufficient time to remove at least 80% of the chlorine from the high-k gate dielectric layer.

35. (new) A method for making a semiconductor device, comprising:
forming a high-k gate dielectric layer on a substrate, the high-k gate dielectric layer comprising impurities and oxygen;
exposing the high-k gate dielectric layer to a solution that comprises a chemical selected from the group consisting of deionized water and a tetraalkyl ammonium hydroxide at a sufficient temperature for a sufficient time to remove impurities from the high-k gate dielectric layer and to increase the oxygen content of the high-k gate dielectric layer; and
forming a gate electrode on the high-k gate dielectric layer.

36. (new) The method of claim 35, wherein the solution comprises deionized water.

37. (new) The method of claim 35, wherein the solution comprises a tetraalkyl ammonium hydroxide.

38. (new) The method of claim 35, further comprising applying sonic energy while the high-k gate dielectric layer is exposed to the solution that comprises a chemical selected from the group consisting of deionized water and a tetraalkyl ammonium hydroxide.